

Claims

1. A linear actuator, including:

at least one sub-module adapted to undergo reciprocal translation in a first

5 direction;

at least one shape memory component, extending generally in said first direction;

means for heating said at least one shape memory component beyond the memory transition temperature to contract said shape memory component and
10 urge said at least one sub-module to translate in said first direction and undergoing a stroke displacement.

2. The linear actuator of claim 1, wherein said means for heating includes an electrical circuit connected to said at least one shape memory components for
15 ohmic heating thereof.

3. The linear actuator of claim 1, further including return spring means for resiliently opposing said stroke displacement.

20 4. The linear actuator of claim 3, wherein said return spring means generates a return force versus displacement characteristic that is optimized to relax and extend said at least one shape memory component with minimum residual strain.

5. The linear actuator of claim 4, wherein said return spring means comprises a rolamite spring assembly.

5 6. The linear actuator of claim 3, further including a fixed anchor point, and said return spring means is connected between said at least one sub-module and said fixed anchor point.

10 7. The linear actuator of claim 1, further including a housing having interior features impinging on said at least one sub-module to support said sub-module in reciprocally translating fashion.

15 8. The linear actuator of claim 1, further including means for cooling said at least one shape memory component.

 9. The linear actuator of claim 1, wherein said means for cooling includes a heat-conducting fluid surrounding said at least one shape memory component.

20 10. The linear actuator of claim 3, wherein said return spring means generates a return force versus displacement characteristic that is substantially linear through a portion of the excursion of said return spring means.

11. The linear actuator of claim 3, wherein said spring means comprises a deflectable beam spring.

12. The linear actuator of claim 3, wherein said spring means comprises a
5 bar adapted for reciprocal translation, said bar including a cam surface, and cam
follower means impinging on said cam surface to exert a restoring force that is a
function of the slope of said cam surface.